

Notice of Allowability	Application No.	Applicant(s)	
	09/474,715	AUFRICHTIG ET AL.	
	Examiner	Art Unit	
	Samir A. Ahmed	2623	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address--

All claims being allowable, PROSECUTION ON THE MERITS IS (OR REMAINS) CLOSED in this application. If not included herewith (or previously mailed), a Notice of Allowance (PTOL-85) or other appropriate communication will be mailed in due course. **THIS NOTICE OF ALLOWABILITY IS NOT A GRANT OF PATENT RIGHTS.** This application is subject to withdrawal from issue at the initiative of the Office or upon petition by the applicant. See 37 CFR 1.313 and MPEP 1308.

1. ☒ This communication is responsive to phone interview on 9/02, 9/05 and 9/06/05.
2. ☒ The allowed claim(s) is/are 5-8, 10-11, 13, 15-35, 37, 39-44, 47-59, 61-76, 78 (now renumbered 1-65 for issue).
3. ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
 - a) ☐ All b) ☐ Some* c) ☐ None of the:
 1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. ____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this national stage application from the International Bureau (PCT Rule 17.2(a)).

* Certified copies not received: ____.

Applicant has THREE MONTHS FROM THE "MAILING DATE" of this communication to file a reply complying with the requirements noted below. Failure to timely comply will result in ABANDONMENT of this application.

THIS THREE-MONTH PERIOD IS NOT EXTENDABLE.

4. ☐ A SUBSTITUTE OATH OR DECLARATION must be submitted. Note the attached EXAMINER'S AMENDMENT or NOTICE OF INFORMAL PATENT APPLICATION (PTO-152) which gives reason(s) why the oath or declaration is deficient.
5. ☐ CORRECTED DRAWINGS (as "replacement sheets") must be submitted.
 - (a) ☐ including changes required by the Notice of Draftsperson's Patent Drawing Review (PTO-948) attached
 - 1) ☐ hereto or 2) ☐ to Paper No./Mail Date ____.
 - (b) ☐ including changes required by the attached Examiner's Amendment / Comment or in the Office action of Paper No./Mail Date ____.

Identifying indicia such as the application number (see 37 CFR 1.84(c)) should be written on the drawings in the front (not the back) of each sheet. Replacement sheet(s) should be labeled as such in the header according to 37 CFR 1.121(d).
6. ☐ DEPOSIT OF and/or INFORMATION about the deposit of BIOLOGICAL MATERIAL must be submitted. Note the attached Examiner's comment regarding REQUIREMENT FOR THE DEPOSIT OF BIOLOGICAL MATERIAL.

Attachment(s)

- | | |
|--|--|
| 1. <input type="checkbox"/> Notice of References Cited (PTO-892) | 5. <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| 2. <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 6. <input checked="" type="checkbox"/> Interview Summary (PTO-413),
Paper No./Mail Date <u>20050907</u> . |
| 3. <input type="checkbox"/> Information Disclosure Statements (PTO-1449 or PTO/SB/08),
Paper No./Mail Date ____ | 7. <input checked="" type="checkbox"/> Examiner's Amendment/Comment |
| 4. <input type="checkbox"/> Examiner's Comment Regarding Requirement for Deposit
of Biological Material | 8. <input checked="" type="checkbox"/> Examiner's Statement of Reasons for Allowance |
| | 9. <input type="checkbox"/> Other ____. |

EXAMINER'S AMENDMENT

1. An examiner's amendment to the record appears below. Should the changes and/or additions be unacceptable to applicant, an amendment may be filed as provided by 37 CFR 1.312. To ensure consideration of such an amendment, it MUST be submitted no later than the payment of the issue fee.

2. Authorization for the following Examiner's amendment was given in a telephone interview with Marcus A. Burch (reg. # 52,673) on 9/02/05, 9/05/09 and 09/06/05, acting as applicants representative, authorized the following amendment:

Please cancel claims 1, 2, 4, 9, 14, 36, 38, 45-46, 60, 77, 79-81 and amend the claims as follows:

10. A system for correcting a defective pixel in an image produced by a detector, comprising:

a processor coupled to the detector, the processor configured to determine a local gradient and to generate a correction value based on the local gradient, wherein the image includes an array of pixels, each pixel having a corresponding pixel value, and the local gradient comprising an array of local gradient matrix elements;

wherein the at least a portion of the array of pixel values comprises a matrix, and includes the defective pixel as a center matrix element and each surrounding neighboring pixel of the defective pixel as additional matrix elements; and

wherein the correction value comprises at least one of a linear interpolation and a weighted average of pixel values corresponding to pixels selected based on a determination that they had the highest local gradient.

15. The system of claim ~~[[14]]~~ 10 wherein the highest local gradient matrix elements include at least three highest local gradient matrix elements.

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29. A method for correcting a defective pixel in an image produced by a digital x-ray detector, the image including an array of pixels and the array of pixels having a corresponding array of pixel values, the method comprising:

acquiring an image from the digital x-ray detector;

identifying the defective pixel in the image produced by the detector before determining a local gradient;

determining a local gradient, the local gradient comprising an array of local gradient matrix elements;

temporarily replacing the defective pixel with a temporary value based on a linear interpolation of a surrounding neighboring pixels of the defective pixel before determining a local gradient such that determining the local gradient comprises determining the local gradient using the temporary value of the defective pixel;

providing a correction value, which is based on the local gradient, to correct the defective pixel; and

replacing the defective pixel with the correction value.

wherein the at least a portion of the array of pixel values comprises a matrix, and includes the defective pixel as a center matrix element and each surrounding neighboring pixel of the defective pixel as additional matrix elements.

37. A method for correcting a defective pixel in an image produced by an x-ray detector having a defective input at the pixel, the image including an array of pixels and the pixels having corresponding pixel values, the method comprising:

receiving the image from the x-ray detector;

analyzing global characteristics of pixels in proximity to the defective pixel; and correcting the defective pixel based on the global characteristics;

wherein the pixels in proximity to the defective pixel whose global characteristics are analyzed include at least a few pixels that are within a three pixel radius of the defective pixel, and that do not border the defective pixel.

39. The method of claim [[38]] 37 wherein analyzing global characteristics of pixels in proximity to the defective pixel comprises determining gradient pixel values of pixels in proximity to the defective pixel.

41. The method of claim ~~[[38]]~~ 37, wherein the pixels surrounding the defective pixel whose global characteristics are analyzed include at least those pixels within a 5 by 5 array where the defective pixel is at a center of the array.

44. A method for correcting a defective pixel in an image produced by a digital detector having a defective input at the defective pixel, the image including an array of pixels and the pixels having corresponding pixel values, the method comprising:

analyzing a characteristic of each of a plurality of pixels;

selecting a first pixel of the plurality of pixels having a first pixel value based on the analyzed characteristic of the first pixel;

selecting a second pixel of the plurality of pixels having a second pixel value based on the analyzed characteristic of the second pixel;

selecting a third pixel of the plurality of pixels having a third pixel value based on the analyzed characteristic of the third pixel; and

providing a pixel value for the defective pixel using the first, second, and third pixel values;

wherein the analyzed characteristic comprises a gradient of the pixel being analyzed; and
wherein determining the gradient for each pixel includes temporarily replacing the pixel value of the defective pixel with a calculated pixel value.

47. The method of claim ~~[[45]]~~ 44, wherein the provided pixel value comprises a linear average of pixel values from pixels that are not defective.

48. The method of claim ~~[[45]]~~ 44, wherein *the* gradient for each pixel is determined by at least one of a Laplacian of a Gaussian filter kernel, a Roberts gradient kernel, a Prewitt gradient kernel, and a Sobel gradient kernel.

49. A method for correcting a defective pixel in an image produced by a digital detector having a defective input at the defective pixel, the image including an array of pixels and the pixels having corresponding pixel values, the method comprising

analyzing a characteristic of each of a plurality of pixels, the characteristic comprising a gradient

selecting a first pixel of the plurality of pixels having a first pixel value based on the analyzed characteristic of the first pixel;

selecting a second pixel of the plurality of pixels having a second pixel value

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based on the analyzed characteristic of the second pixel;

selecting a third pixel of the plurality of pixels having a third pixel value based on the analyzed characteristic of the third pixel; and

providing a pixel value for the defective pixel using the first, second, and third pixel values;

wherein the gradient for each pixel is determined by $G_i = \sqrt{(A_i * H)^2 + (A_i * (-H))^2}$

where A_i is a matrix of pixel values comprising the image and H is a gradient kernel matrix.

50. The method of claim [[45]] 44, wherein the first, second, and third pixels are selected based on having a highest gradient value of the plurality of pixels that are analyzed.

59. The method of claim 76, wherein,

the image is received from an x-ray detector; and

selecting which values to use to provide a value for the defective pixel for the first image based on a characteristic of the first image comprises,

analyzing a characteristic of each of a plurality of pixels, the characteristic for each of the plurality of pixels based on pixel values of the first image;

selecting a first pixel of the plurality of pixels having a first pixel value based on the analyzed characteristic of the first pixel;

selecting a second pixel of the plurality of pixels having a second pixel value based on the analyzed characteristic of the second pixel; and

providing a pixel value for the defective pixel for the first image using the first and second pixel values.

61. The method of claim [[60]] 59, wherein determining the gradient for each pixel includes temporarily replacing the pixel value of the defective pixel with a calculated pixel value.

63. The method of claim [[60]] 59, wherein the gradients for the first and second pixels are determined by at least one of a Laplacian of a Gaussian filter kernel, a Roberts gradient kernel, a Prewitt gradient kernel, and a Sobel gradient kernel.

64. A method for correcting a defective pixel in an image produced by an x-ray detector having a defective input pixel, the image including an array of pixels and the pixels having corresponding pixel values, the method comprising:

receiving an image from the x-ray detector, and

selecting which values to use to provide a value for the defective pixel for the image based on a characteristic of the image, comprising,

analyzing a characteristic of each of a plurality of pixels, the characteristic for each of the plurality of pixels comprising a gradient of the plurality of pixels;

selecting a first pixel of the plurality of pixels having a first pixel value based on the analyzed characteristic of the first pixel;

selecting a second pixel of the plurality of pixels having a second pixel value based on the analyzed characteristic of the second pixel; and

providing a pixel value for the defective pixel for the first image using the first and second pixel values;

wherein the gradient for the first and second pixels are determined by applying
$$G_i = \sqrt{(A_i * H)^2 + (A_i * (-H))^2}$$
where A_i is a matrix of pixel values comprising the image and H is a gradient kernel matrix.

65. The method of claim [[60]] 59 wherein the first and second pixels are selected based on having a highest gradient value of the plurality of pixels that are analyzed.

76. A method for correcting a defective pixel in an image produced by a detector having a defective input ate-pixel, the image including an array of pixels and the pixels having corresponding pixel values, the method comprising:

receiving [[a]] an image from the detector, and

selecting which values to use to provide a value for the defective pixel for the image based on a characteristic of the image, the characteristic of the image comprising values of a plurality of pixels in the image, the plurality of pixels neighboring the defective pixel;

wherein the gradient values of the plurality of pixels in image neighboring the defective pixel are determined by a process comprising replacing the defective pixel with a temporary value, the temporary value based on values of neighboring pixels of the defective pixel.

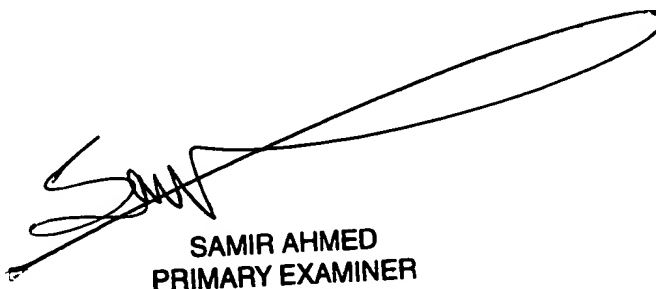
78. A method for correcting a defective pixel in an image produced by a detector having a defective input pixel, the image including an array of pixels and the pixels having corresponding pixel values, the method comprising:

receiving an image from the detector; and

selecting which values to use to provide a value for the defective pixel for the image based on a characteristic of the image, the characteristic of the image comprising gradient values of a plurality of pixels in the image, the plurality of pixels neighboring the defective pixel; and

providing the value for the defective pixel for the image;

wherein providing the value for the defective pixel for first image includes at least one of a linear interpolation and a weighted average of pixel values corresponding to pixels selected based on a determination that they had highest local gradients of the gradient values of the plurality of pixels neighboring the defective pixel.



SAMIR AHMED
PRIMARY EXAMINER

REASONS FOR ALLOWANCE

3. The following is an examiner's statement of reasons for allowance: Applicant argues on page 8, section D of the Appeal Brief filed 11/15/04 that "claim 19 has limitations which are written in a means plus function format and which should be interpreted under 35 U.S.C. 112, sixth paragraph. These claims are directed to correcting a defective pixel. Examples of systems according to these claims are discussed in the specification at page 6, line 22 to page 9, line 12. The embodiments corresponding to the means for determining a local gradient are discussed in the specification of the present application with respect to step 46 of Fig. 3. The embodiments corresponding to the means for providing a correction value based on the local gradient are discussed in the specification of the present application with respect to step 48 of Fig. 3. Steps 46 and 48 can be found in the specification at page 6, line 22 to page 7, line 2 and at page 8, line 3 to page 9, line 4". Claim 19 complies with 112, 6th paragraph and corresponds to the embodiments of the specification stated above and the equivalents.

Any comments considered necessary by applicant must be submitted no later than the payment of the issue fee and, to avoid processing delays, should preferably accompany the issue fee. Such submissions should be clearly labeled "Comments on Statement of Reasons for Allowance."

4. Claims 5-8, 10-11, 13, 15-35, 37, 39-44, 47-59, 61-76, 78 (now renumbered 1-65 for issue) are allowed.

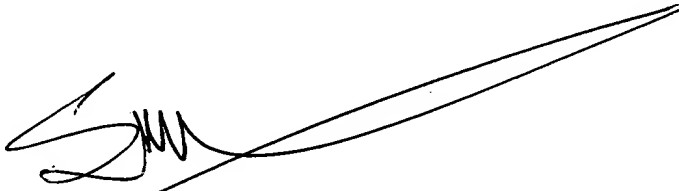
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Any inquiry concerning this communication or earlier communications from the examiner should be directed to Samir A. Ahmed whose telephone number is (571) 272-7413. The examiner can normally be reached on Mon-Fri 8:30am-6:00pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Amelia Au can be reached on (571) 272-7414. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

SA



**SAMIR AHMED
PRIMARY EXAMINER**